REMARKS

The Office Action mailed July 13, 2001 has been reviewed and carefully considered. Claims 6 and 7 are cancelled. Claims 5, 8, and 9 have been amended. Claims 5 and 8-9 are pending in this application, with claim 5 being the only independent claim. Reconsideration of the above-identified application, as herein amended and in view of the following remarks, is respectfully requested.

In the Office Action mailed July 13, 2001, claim 7 stands rejected under 35 U.S.C. § 112, second paragraph, as indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner states that the term "specific" is vague and should be changed to --specific heat--. The limitations of original claim 7 have been included in amended independent claim 5 and the suggested correction has been implemented. Accordingly, it is respectfully requested that the rejection of claim 7 under 35 U.S.C. §112, second paragraph, now be withdrawn.

Claims 5-9 stand rejected under 35 U.S.C. §103 as unpatentable over Simsek, "Dynamic Simulation of Dual-Line Continuous Strip Processing Operations" (Simsek) in view of U.S. Patent No. 5,509,460 (Chun).

As stated in the Office Action, Simsek discloses a method for determining and controlling the material flow of continuous cast slabs in a continuous casting installation by monitoring and optimizing the temperature on the transport path. However, as noted in the Office Action Simsek fails to disclose the following sets of limitations: (1) determining the liquid phase and physical parameters such as density of the slab at the mold exit, controlling material flow in the continuous casting installation via a slab monitoring system and using the amount of heat and the temperature profile determined in said step (b) as an input to the slab monitoring system, and (2)

that step (a) comprises determining a surface temperature of the continuous slab and step (c) comprises automatically controlling the material flow via the slab monitoring system based on the amount of heat and the temperature profile determined in step (b) and the surface temperature determined in step (a).

The first set of limitations listed above is recited in amended independent claim 5. The second set of limitations is recited in dependent claims 8 and 9.

Chun fails to teach what Simsek lacks. Chun teaches the use of gamma radiation to determine the liquid/solid metal interface. Since the densities of the liquid and solid metals are different by between two and ten percent, the path length of the liquid metal can be calculated by the attenuation of gamma ray intensity detected at a penetration detector. The use of the attenuation of gamma ray intensity to determine the liquid or solid fraction of metal along the path fails to teach or suggest the steps of "determining a temperature of the liquid phase of the continuous-cast slab at a mold exit of the continuous-casting installation and physical parameters of the continuous-cast slab including temperature-dependent material values comprising at least one of density ρ, specific heat C_p, thermal conductivity λ, and scale properties", and "determining an amount of heat and a temperature profile of the continuous-cast slab by calculating the convective mixing of the amount of heat contained in the continuous-cast slab and the time-dependent heat loss from the inhomogenously cooling of the continuous-cast slab". Instead of using a temperature measured in step (a) of the present invention and a calculated temperature profile as determined in step (b) of the present invention to determine a solid/liquid interface, Chun teaches that the detection of gamma ray attenuation is used to determine the solid/liquid interface of a strand. Accordingly, Chun fails to teach or suggest the limitations of independent claim 5.

Each of dependent claims 8 and 9 further include the limitation "determining a surface temperature of the continuous-cast slab." It is respectfully submitted that the detection of gamma radiation attenuation disclosed by Chun also fails to disclose the determination of surface temperature. Accordingly, it is respectfully submitted that dependent claims 8 and 9, being dependent on independent claim 5, are allowable for the same reasons that independent claim 5 is allowable, as well as for these additional reasons.

The application is now deemed to be in condition for allowance and notice to that effect is solicited.

It is believed that no fees or charges are required at this time in connection with the present application; however, if any fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

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AMENDMENTS TO THE SPECIFICATION AND CLAIMS SHOWING CHANGES

In the Claims:

Claims 5, 8, and 9 are amended as follows:

--5. (Amended) A method for determining and controlling the material flow of continuous-cast slabs in a continuous casting installation by monitoring and optimizing the temperature on the transport path of the continuous-cast slabs between the continuous-casting installation and a rolling mill, said method comprising the steps of :

a. determining a temperature of the liquid phase of the continuous-cast slab at a mold exit of the continuous-casting installation and physical parameters of the continuous-cast slab including temperature-dependent material values comprising at least one of density ρ, specific heat C_p, thermal conductivity λ, and scale properties;

b. determining an amount of heat and a temperature profile of the continuous-cast slab by calculating the convective mixing of the amount of heat contained in the continuous-cast slab and the time-dependent heat loss from the inhomogenously cooling of the continuous-cast slab, wherein the step of calculating comprises using a mathematical-physical model calculated using one of a two-dimensional finite element method, a finite difference method, and software using formulas derived from off-line studies; and

c. controlling the material flow in the continuous-casting installation via a slab-monitoring system of the continuous-casting installation and using the amount of heat and the temperature profile determined in said step b. as an input to the slab-monitoring system.--

--8. (Amended) The method of claim [1] 5, wherein said step a. further comprises determining a surface temperature of the continuous-cast slab, said step c. comprises using a surface temperature of the continuous-cast slab determined in said step a. as an input to the slab monitoring system, and said step c. further comprises automatically controlling the material flow via the slab monitoring system based on the amount of heat and the temperature profile determined in said step b. and the surface temperature of the continuous-cast slab.--

--9. (Amended) The method of claim [1] 5, wherein said step a. further comprises determining a surface temperature of the continuous-cast slab and said step c. further comprises using the surface temperature of the continuous cast slab measured in said step a. as an input to the slab monitoring system.--